Citizens' Bulletin

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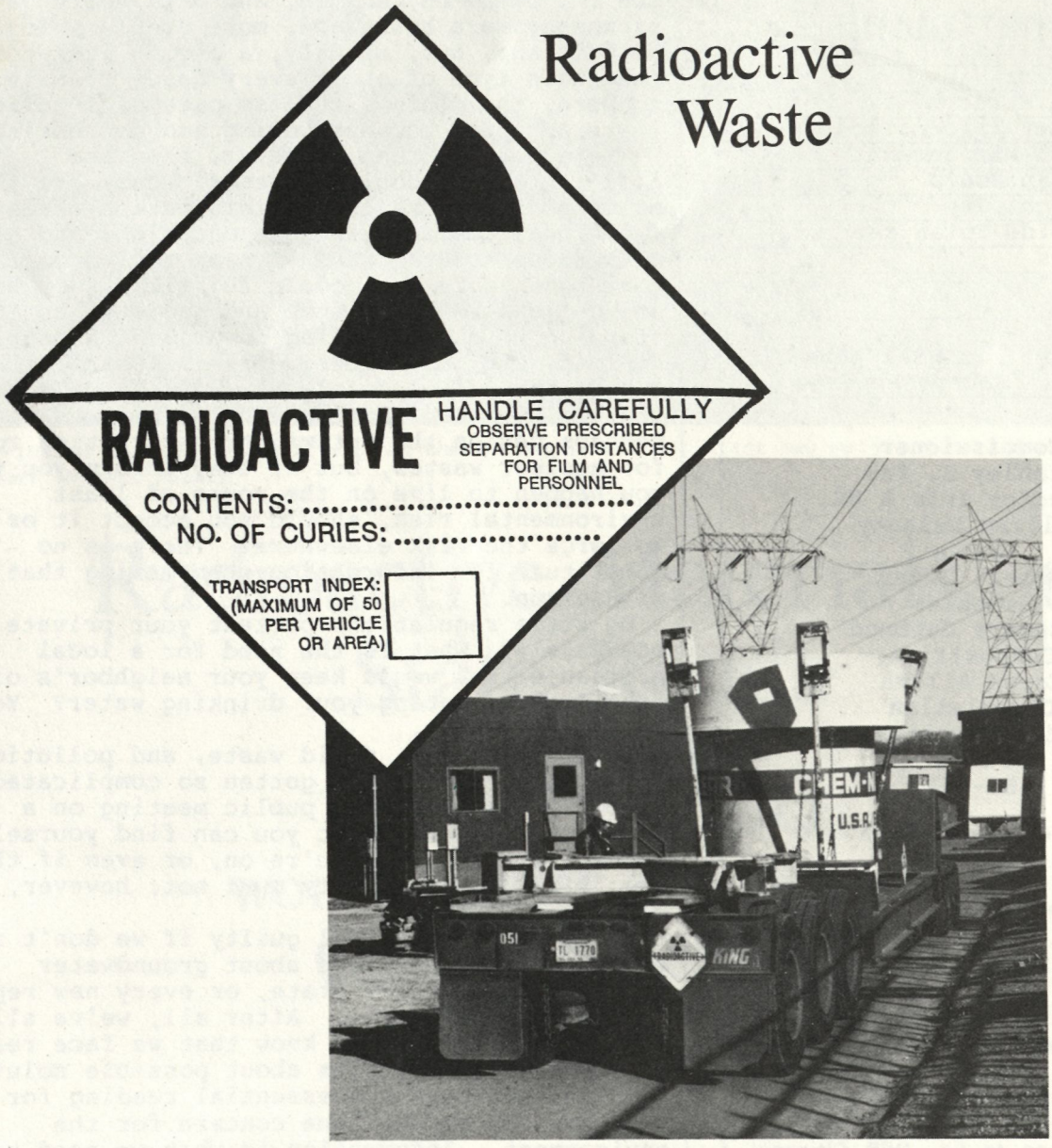
The Connecticut Department of Environmental Protection

Radioactive Waste



Moving it out safely and fast

Citizens' Bulletin

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Features

Departments

Cover:
Rad-waste at Millstone
(Photo: Robert Paier)

Commissioner
Stanley J. Pac
Director Info & Ed
William Delaney
Editor
Robert Paier
Graphics
Rosemary Gutbrod
Composition
Caryn Alleva
Circulation
Olive Tyghter
Phone
566-5524

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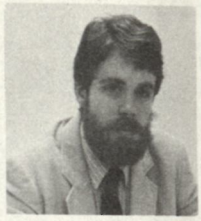
The Wider View

A Need to Know, and a Need to Act



By Karl Wagener, Director, Council on Environmental Quality

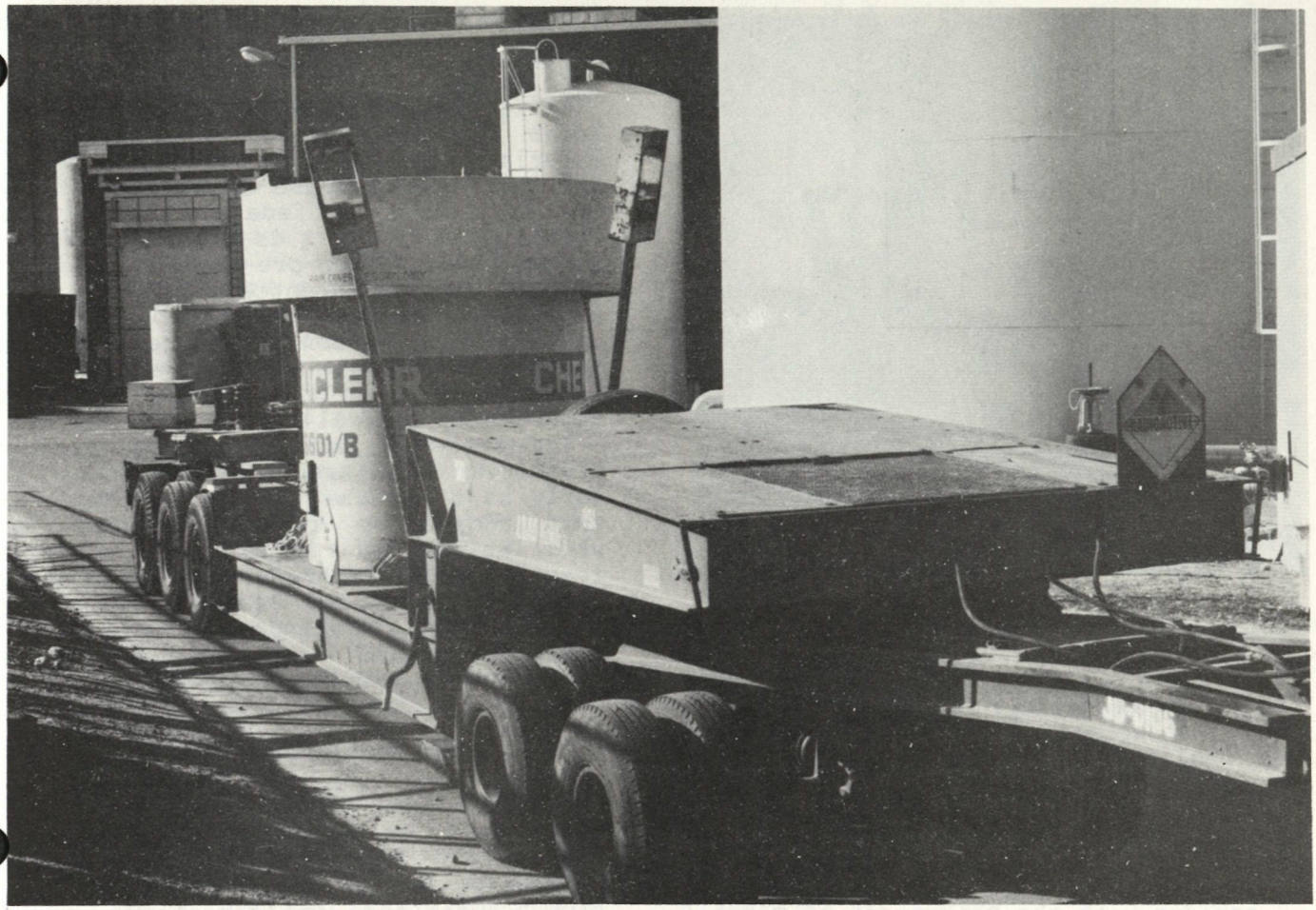
We all want to be counted as belonging to the "informed public," but there is a limit to the number of news articles we can read that begin: "Environmental and health officials determined earlier this week that several wells in the Happy Acres section of Happytown, Connecticut, were contaminated with dangerous levels of TCE, EDB . . . and on, and on, and on." More sickness, more heartache, more problems for politicians, but, frankly, a person just cannot read this type of story every day. Despite our concern, the media's endless parade of toxic waste articles becomes boring and depressing.

There are articles, however, that are different, and should be read. These are the articles that give us the information needed by individual citizens to make decisions and to act. Gone are the days when an environmentally concerned individual could fulfill his or her obligations to conscience and society just by standing up and demanding government attention to land, air, and water. The issues of today cannot be handled solely by professionals on the state's payroll. Professional engineers could perhaps design the optimal transportation route for nuclear wastes, but if they inform you that you happen to live on the route of least environmental risk, should you accept it or try to force the risk elsewhere? There is no substitute for information when making that kind of decison.

Do state regulations protect your private well adequately? What is the need for a local ordinance that would keep your neighbor's oil tank from polluting your drinking water? You need information.

Hazardous waste, solid waste, and pollution issues in general have gotten so complicated, that halfway through a public meeting on a resource recovery plant you can find yourself wondering what side you're on, or even if there are "sides." Complexity must not, however, be a cause for inaction.

We don't have to feel guilty if we don't read every newspaper article about groundwater contamination in the state, or every new report on what causes cancer. After all, we've all read enough of them to know that we face real problems. But articles about possible solutions to these problems are essential reading for everyone who shares true concern for the environment. Information is what we need to stay involved. Either we stay informed and involved, or environmental decisions will be made by the uninformed. ■



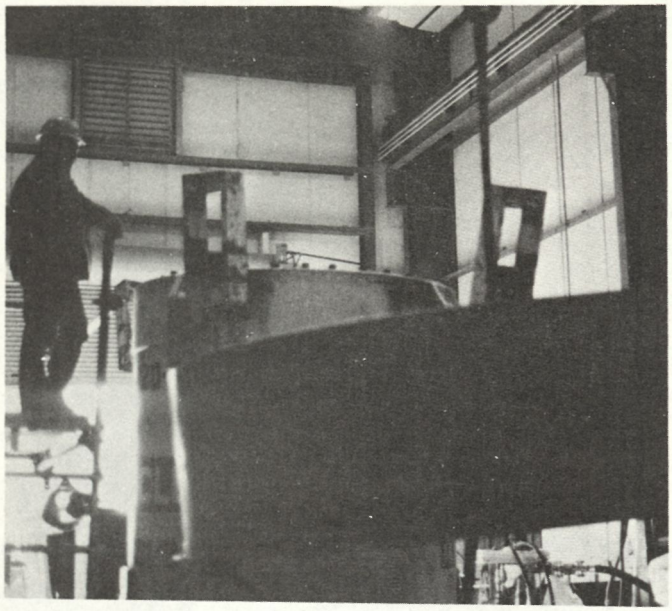
Fully-loaded flatbeds such as this at the Millstone Nuclear Plant may weigh up to 110 thousand pounds. (Photos: Robert Paier)

Radioactive Materials on State Roads

The DEP and DOT work together to safeguard Connecticut citizens

By Martha Kelly

The use of radioactive materials for medicine, research, and industry is increasing rapidly. The benefit from the use of such materials also brings an increased risk of human exposure to ionizing radiation. It is for this



A worker at Millstone sets a cap on a cask of rad-waste prior to shipment out of state.

reason that state governments have established regulatory means to control use of these materials and to safeguard the public from possible dangers they present.

In Connecticut, regulatory responsibility for the transport of all radioactive materials -- raw materials, finished products, and radioactive wastes -- resides with the Department of Transportation (DOT). The DEP's Radiation Control Unit, under the direction of nuclear physicist Kevin McCarthy, provides technical assistance and advice.

Because of the complexity and sensitivity of issues involving radioactivity, there are also four federal agencies which play direct roles in the regulation of the transport of radioacitive materials: the Nuclear Regulatory Commission (NRC); the U.S. Department of Transportation (DOT); the Environmental Protection Agency (EPA); and the Department of Energy (DOE).

As a result of having so many different agencies involved in the same area, there has indeed been, as might be expected, occasional conflict in terms of overlapping authorities and differing approaches. Of particular complexity were instances where routes crossed state lines.

Coordinating State and Federal Regulations

In 1984, the federal DOT established HM-164. By this rule, all previously existing state and municipal regulations in regard to the transport of radioactive material would now be coordinated and, if necessary, reinterpreted in order to be consistent with federal regulation.

HM-164 states clearly that state and local regulations regarding radioactive materials, driver training requirements, and routing which are inconsistent with the provisions of federal law will be "pre-empted." There is some flexibility in this, as a "non-pre-emption determination" may be granted if it can be shown that existing regulations "do not unreasonably burden commerce," or if they "afford an equal or greater level of protection to the public" than is afforded by federal regulation.

The state of Connecticut has been a pioneer in this area of regulation. As early as 1976, the Connecticut legislature adopted a regulatory framework which served as a model for the later federal rule. Therefore, according to Richard Tourville, Chief of Motor Carrier Operations for the state DOT, Connecticut will have no difficulty in conforming to the new rule.

The Regulatory Process

In Connecticut, some materials are considered to be so sensitive in nature that their mishandling could pose a threat to public health. Before hazardous material of this kind can be moved by motor carrier in the state, then, a permit must be issued. Three hundred such permits are processed daily. Of that total, approximately 900 per year involve radioactive materials. (It should be noted here that on occasion even when a material may in fact be considered hazardous, it may not require a shipment permit if it is shipped in very small quantities. In this case, while the material would be considered hazardous, the quantity would not.)

A substance is determined to be radioactive, according to federal DOT rules and regulations (Title 49), if it "spontaneously emits ionizing radiation, and has a specific activity greater than 0.002 microcuries per gram." Such substances require special handling and labeling.

Not only do individual packages require special labeling but, if quantity and level of specific activity warrant, the vehicles which carry the substances must be clearly marked with placards. This "placarding" of shipments is controlled by the state DOT's Motor Carrier Operations Unit.

A very strict time frame is involved in the permit process. Requests for permits are only accepted in the 24-hour

period immediately prior to shipment, and no later than two hours prior to shipment. This tight restriction assures the kind of close supervison necessary to insure public safety.

"By the shortest practical route, out."

The ultimate purpose of all this regulation is to move materials through the state as rapidly as possible, to assure a minimum degree of exposure to the public, and to provide for the fastest possible response by expert emergency personnel in the event of a mishap. State police are routinely informed of all such shipments and their routes. Radioactive materials may only be moved on weekdays, between 9 a.m. and 4 p.m. Days before holidays are also restricted, because of the danger of increased traffic at those times.

There are exceptions. Defense-related materials are completely exempt from state regulation and, because of the extremely short half-life involved, the timing restrictions for medical materials may be waived.

The choice of a particular route is also determined by regulation. According to Richard Tourville: "All our loads are shipped by the shortest practical route to the Interstate and then, by the Interstate, out." Radioactive materials are on state roads the absolute minimum of time.

Rad-waste from the Power Plants

In fact, the vast majority of shipments through Connecticut involve materials of fairly low-level radioactivity. Both Tourville and McCarthy indicate that only a very small percentage of annual shipments involve high-level radioactive wastes. The spent fuel from the fission process which takes place at the power plants is many times more radioactive than fresh, unused nuclear fuel. McCarthy points out that although the issue of transporting spent nuclear fuel has been much in the public eye recently, none of this fuel has come from Connecticut's power plants. At both Connecticut Yankee and the Millstone plants, spent nuclear fuel has been stored in deep water-filled holding tanks, where it "cools" both in a thermal sense and in terms of radioactivity.

McCarthy estimated that approximately once every 18 months, one of the power plants sends a small quantity of spent fuel to be tested in a laboratory in California or Ohio. These shipments are undertaken under the highest level of security and planning. For example, federal packaging requirements for such shipments call for the use of heavily shielded casks designed to withstand a collision with a speeding locomotive without a breach of the containment system. Simulations involving rocket propulsion and immersion in a jet fuel fire have been used to test the integrity of this packaging system.

When shipped by rail, the specially designed cask rides on a strengthened rail car weighing some 250,000 pounds. To date, in the few highway accidents which have occurred during the transport of nuclear wastes, not one has resulted in breach of the cask.

Connecticut's Safety Record

Connecticut has an enviable record in the area of nuclear transport. The only incidents of which Tourville is aware occurred in 1974 and 1976. Both were minor incidents -- one involving a truck brake lining which caught fire, the other a disrupted harness mounting on a flat bed -- and neither resulted in any leakage of radioactivity. The second of those incidents also resulted in the passage of Connecticut's present transportation legislation.

Both Tourville and McCarthy express confidence in the precautions taken in regard to the transport of radioactive materials through our state. Clear legislation, well-defined responsiblity, and close monitoring and enforcement procedures have combined to insure that hazardous materials move through our state quickly and safely. ■

The vast majority of shipments through Connecticut involve materials of fairly low radioactivity.

(Photo: Robert Paier)

On the Special Magic of New England Snow

Text and drawings by Penni Sharp

In the thick of a teeming snowfall
I saw my shadow on snow.
I turned and looked back up at the sky,
Where we still look to ask the why
Of everything below.

Robert Frost, "Afterflakes"

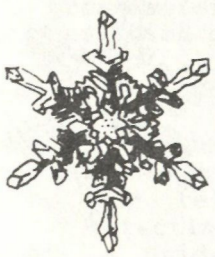
Here in New England, snow is an important part of our lives. We measure time in terms of great storms and blizzards that remain long in our memories. Some old-timers still remember their parents talking about the Great Blizzard of 1888 which, among other things, brought New York City to a complete standstill. We are paralyzed by these storms. Schools close, highways shut down, normal routines are disrupted. Heavy snows cause dents in municipal budgets, as highway crews work long hours to keep roads open and emergency services available. In larger cities, there is the added problem of where to put it all once you get it off the streets.

An Invitation to Come Out and Play

Like most of us here in New England, I love the snow. I love to step outside and

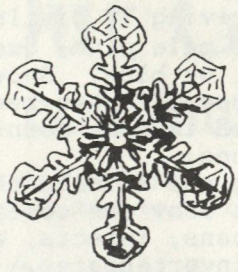
listen to the special quiet that accompanies a snowstorm. Fresh snow brings back memories of childhood . . . making snow angels, catching falling flakes on the tip of the tongue, sledding, pouring warm maple syrup on a scoop of clean snow. Even now, snow means a time to run outside and look for fresh tracks or to strap on a pair of cross-country skis and roam the countryside. When the snow is falling, I think -- for that time,

anyway -- we all become children again. We feel some inner urge, something in all of us that wants to bundle up and go out and play. Snow does that to us here in New England.



A Sense of the Infinite

Snowstorms also inspire a sense of wonder. As snowflakes fall, clump together, and accumulate to a measureable thickness, we are impressed by the sheer numbers of them. Then, to look upward and watch the swirling flakes, we seem to



be able to touch the infinite. Reflecting the vast universe of a snowstorm is the intricacy of a single snowflake, another infinity in miniature. In itself, a single snowflake is a unique expression of exquisite delicacy and beauty.

We are told that "no two snowflakes are alike." If we consider that it takes

more than a million snow crystals to cover an area two feet square with 10 inches of snow, and if we further consider the eons that snow has fallen on this planet, it seems reasonable to assume that perhaps some crystals have been, at least, hard to tell apart. In any event, there is certainly tremendous variety among snowflakes, and the possibility that two may be alike does little to diminish the magic they seem to contain.

The Formation of a Snow Crystal

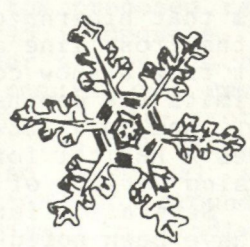
The falling flakes that we see are aggregates of snow crystals which are formed high up in the Earth's atmosphere, where water vapor condenses around dust particles. Droplets of ice crystals form snow clouds, and when the crystals attain a certain size, they fall as snow. A grouping of individual crystals forms a snowflake.

Depending upon the degree of resolution desired, it is possible to identify over 100 types of snow crystals. Some of the more basic forms include star, plate, needle, column, and irregular. The basic structure of the snow crystal is six-sided, although there are exceptions. Three and five-sided crystals have been noted.

Studies have indicated that the temperature and the degree of moisture determine the forms of the crystals. For example, under a given degree of saturation, needle crystals form between 27 degrees and 23 degrees Fahrenheit, whereas at lower temperatures of 10 degrees to three degrees Fahrenheit, star crystals form.

As they journey down through the atmosphere, the crystals undergo modifications. Winds may alter their delicate structure. A given storm may produce a wide variety of crystals, and one type may be succeeded by another as the storm progresses.

Observing a snowflake with a good hand lens will reveal the pattern, but to see details of the crystal structure, observation with



a microscope is necessary.

A Downy Quilt for the Earth

Although many see snow only in terms of the problems it creates, its presence in winter brings a number of

benefits. A blanket of snow over the frozen ground acts as a layer of insulation. Snow that is light and fluffy as it falls has a particularly high insulative value, as there are numerous air spaces between the crystals. This type of snow acts in much the same way as a down quilt.

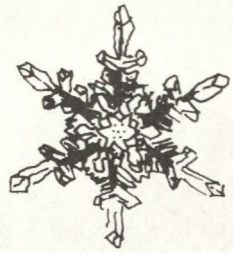
Snow not only insulates, but also guards against extreme fluctuations in temperature. Bare ground warms and cools rapidly in the presence and absence of sunshine, whereas a snow-covered landscape maintains more even temperatures. The roots of trees and other plants are well protected if there is snow cover during periods of below-freezing temperatures, and winterlike damage is noticeably less severe.

Animals In and Of the Snow

Animals that hibernate below the frost line also benefit from a snow cover that limits the depths of freeze. And snow itself provides a habitat for a surprising variety of life forms. Several different algae have been noted in snow, giving it distinct hues of pale pink, green, yellow, or blue. Snow of a deep rose-pink has been reported in some mountain locations.

Among the animals that live in snow are certain protozoans, insects, and other invertebrates. Tiny dark springtails, or "snow fleas," are included in this group and can easily be observed hopping on the surface of snow.

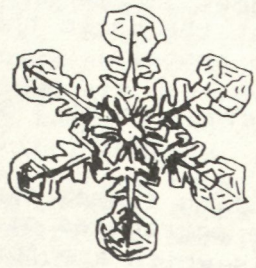
Some small mammals, to include rabbits, squirrels, and field mice, may spend a long part of the winter beneath the snow, moving around in a network of tunnels. In this environment, they are



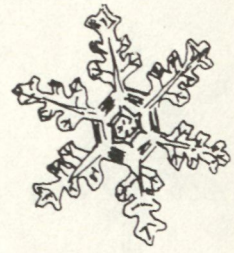
protected from predators and from freezing weather. Thanks to footprints in the snow, we can also identify some of the larger animals that may be active.

Snow and Connecticut's Landscape

In Connecticut, our present landscape owes its appearance to snow. It is a mere 12,000 years since the last glacier receded,



leaving in its wake boulders and other debris, known as drift, that had been transported from the north during the glacier's advance. Valleys were widened, hills smoothed and the pre-glacial sediments scraped away. This mass of ice, actually hard-packed snow, covered all of Connecticut and was as much as a mile in thickness. Its sheer weight caused the land to subside. At that time, approximately one-fourth of the earth was bound up in snow-formed ice, in contrast to today, when approximately 12 percent of the earth remains glaciated. Ice ages have occurred a number of times throughout the world's history, and it is conceivable that in some future epoch, Connecticut may once again lie under a mantle of ice.



Stillness

One of the great joys of living in New England is being able to walk outside during a snowfall and to feel the peacefulness that seems to go with that. When the snow falls, we slow down. We become still and quiet. And that's a very wonderful thing. ■

Protecting Our Groundwater

What every community can do

By Jim Murphy,
Principal Environmental Analyst, Water Compliance Unit

(This is the first of two articles on groundwater protection in Connecticut)

For the past several months, it has been difficult to pick up a newspaper and not see an article on groundwater contamination. Contaminant sources are many and the problem is widespread. The following table is a compilation of recent well pollution incidents in Connecticut.

Table 1.
Incidents of Well Pollution in Connecticut

Type of Well	Pesticides	Solvents	Landfill Leachate	Hydrocarbons Gas & Oil	Road Salt	Other	Total	Pop. affected
1. Domestic	283	156	134	77	43	33	726	2,200
2. Public wells								
a. Community	47	44	1	7	4	10	113	148,000
b. Non-Community		55	4	19	8	3	89	
Total	330	255	139	103	55	46	928	150,200

In fact, most of the problems indicated by the above table have been corrected, but the potential for similar occurrences elsewhere continues to exist.

The DEP and the Department of Health Services are expending many staff-years of effort to protect our drinking water. Significant progress has been made. We should not become complacent, however, and assume that our contamination problems are over. There remains a continuing need for involvement at the community level, and at the level of the individual citizen, to adequately respond to the problem of groundwater contamination. The reason this is such a critical matter is that, quite simply, groundwater is the primary drinking water supply source of one-third of Connecticut's population.

"A Guide for Local Officials"

In response to the need for greater public awareness of groundwater's importance, the DEP released a document titled "Protecting Connecticut's Groundwater: A Guide for Local Officials." This publication discusses basic hydrologic principles and common types of groundwater contamination, and offers guidance to municipal planners. Appended to this document are examples of groundwater protection programs administered by the DEP, a listing of land uses with their relative risk to groundwater quality, and guidelines for assessing and managing specific commercial and industrial activities.

Noted in the appendix to this document were "model ordinances." These regulations, suggested for local adoption, were meant to provide specific guidance in the control of land use activities, and the likelihood of those activities' causing groundwater contamination.

Prior to the release of these "models" by the DEP, they were circulated within the department for evaluation and comment. Not unexpectedly, and almost without exception, the proposed regulations were considered inadequate. Communication with other states which were proposing "model" regulations revealed they were experiencing similar problems.

At this same time, the DEP was in the process of providing technical assistance in preparation of groundwater protection strategies to individual

municipalities. It became clear that the issues and contamination problems facing each community were unique to that community, and that it would be a mistake to impose regulations where they were inappropriate.

The Individual Community and the Role of Government

Each community is unique, not only in its water resource base and supply needs, but also in its administrative capabilities. This realization necessitated a shift in the DEP's emphasis and led to the development of a planning process in which appropriate management tools are selected by directly-involved local officials.

Before we review this process, it is important to examine a few concepts regarding groundwater protection. First of all, we must recognize that groundwater quality is a public health issue. It is the single most pressing public health issue a municipality must address, as almost all towns rely upon groundwater for all or part of their drinking water. Drinking water and public health are inseparable concerns.

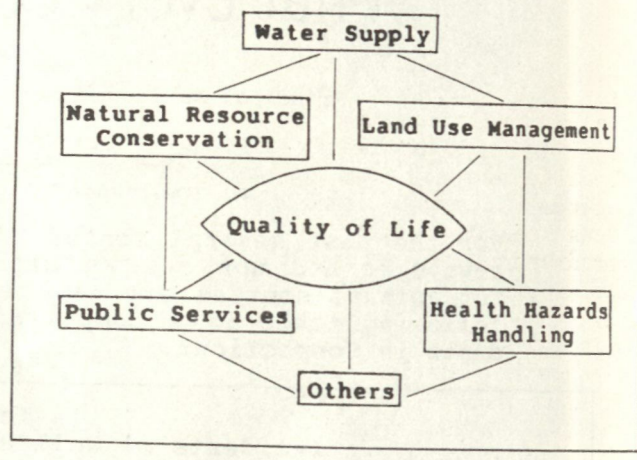
Secondly, the principal role of any government is the protection of the public's health, safety, and welfare. In essence, that is the only reason for government. This means that the responsibility of every federal, state, and local official, elected or appointed, is the well-being of the individual citizen.

Groundwater and Quality of Life

Groundwater protection cannot be addressed in isolation, separate from other aspects of a community. Safe well water is certainly critical to health and safety, but what about the services provided by town government -- the schools, garbage collection, recreation, and land use controls? If we take a comprehensive view of all this, we find we are really considering the total "quality of life" in a town. Please refer to Figure 1.

If there are problems in any of these areas, then the quality of life diminishes. For example, if wastes -- residential or industrial -- are not properly handled, then adverse impact can be expected. If natural resources -- forests or flowing water -- are not properly protected, then the recreation and other amenities they offer will be reduced. Almost all land use activities affect the quality and quantity of groundwater. Protecting these drinking water sources, therefore, requires consideration of everything that occurs in a town. And, consequently, by protecting groundwater the quality of life is also protected.

Figure 1. Factors Affecting Quality of Life



The Job of Local Government

Towns may now well ask of DEP, as we did of ourselves, "What can and should local governments do?"

First of all, we must examine how groundwater gets contaminated and how contaminants are regulated. Basically, waste discharges are regulated by state government. But, as Table 1 shows, many wells were not contaminated by discharges, but by spills and leaks of substances from commercial establishments and private homes. No permit is required to use contaminants of this type, just to dispose of them.

The "Groundwater Guide" lists high-risk land uses. It is very important that these activities be strictly controlled. Application of land use controls is the principal item to be addressed. Second to that is the need for appropriate controls at high-risk facilities.

Local government determines the quality of life in a town. The Connecticut General Assembly, in recognizing this, passed Public Act 85-279, "An Act Concerning the Protection of Public Water Supplies." This law, which became effective on October 1, 1985, mandated each planning and zoning commission to consider protection of present and future water supplies. In essence, each town must act to protect its own quality of life, and groundwater quality must be a principal consideration.

Developing a Planning Process

Now, if we recognize all the above, we are headed in the right direction, but have yet to examine the details involved in planning for groundwater protection. The DEP has developed a "Planning Process" for use by municipalities. It will be released in January of 1986. To develop it, the DEP spent several months examining local government planning and zoning activities. It consulted with local officials, with planning professionals, and with groundwater protection experts in other states. The conclusions reached are set forth in the recommended "Planning Process" publication, and will be briefly summarized here.

In managing the state's natural environment, the DEP draws on the talents of many people from many fields of expertise. The "glue" which holds all this together and which provides direction and purpose is the specific management plan. These plans consist of assessments of where we are, what goals we intend to achieve, and the strategies we will use to achieve them. Though municipal government does function in a similar fashion, groundwater protection is a relatively new issue at that level. Since PA 85-279 has provided the impetus for local action in many communities, the task before us is to initiate the proper actions, preferably in a planned, comprehensive fashion.

New DEP Publication

Recognizing that local officials are best able to understand their own town, and that the subject is their town's future, the DEP will soon release a suggested planning process. The DEP strongly recommends every municipality consider using the document titled: "Groundwater Protection: A Public Health Planning Process." Consisting of four phases, this process is designed to help local officials make decisions in the town's best interests.

It is suggested that a working committee be established in each town, with one member each from the planning, zoning, conservation, inland-wetlands, and recreation commissions. This group will represent the major land use interests in a town and, as such, will have the responsibility, expertise, and vested interest to assure that the planning process is completed in a timely fashion.

Phases of the Planning Process

The first phase of the process consists of drawing appropriate maps and collecting pertinent information. This will constitute an information base upon which succeeding steps will rely for guidance. The second phase will require evaluation of the information base and an assessment of what it means for the town's future. The third phase requires the town set specific land use and administrative goals. The fourth phase calls for selection of specific management tools to achieve the goals set in phase three. Once the particular management tools are identified, the town must commit itself to their conscientious implementation.

There are numerous actions a municipality can take to achieve groundwater protection, and they will be listed in the planning document. Many of the suggested mechanisms do, in fact, already exist, but do not as yet address groundwater protection.

It is important to recall that since almost all land use activities have the potential to impact groundwater, a variety of controls must be considered. This is not to suggest a town immediately implement every protection technique identified in phase four. It is unreasonable to expect local boards, commissions, or staff to administer a number of new programs, or handle a significantly increased workload. But, just as the suggested planning effort proceeds in logical phases, so should the implementation of the protection mechanisms.

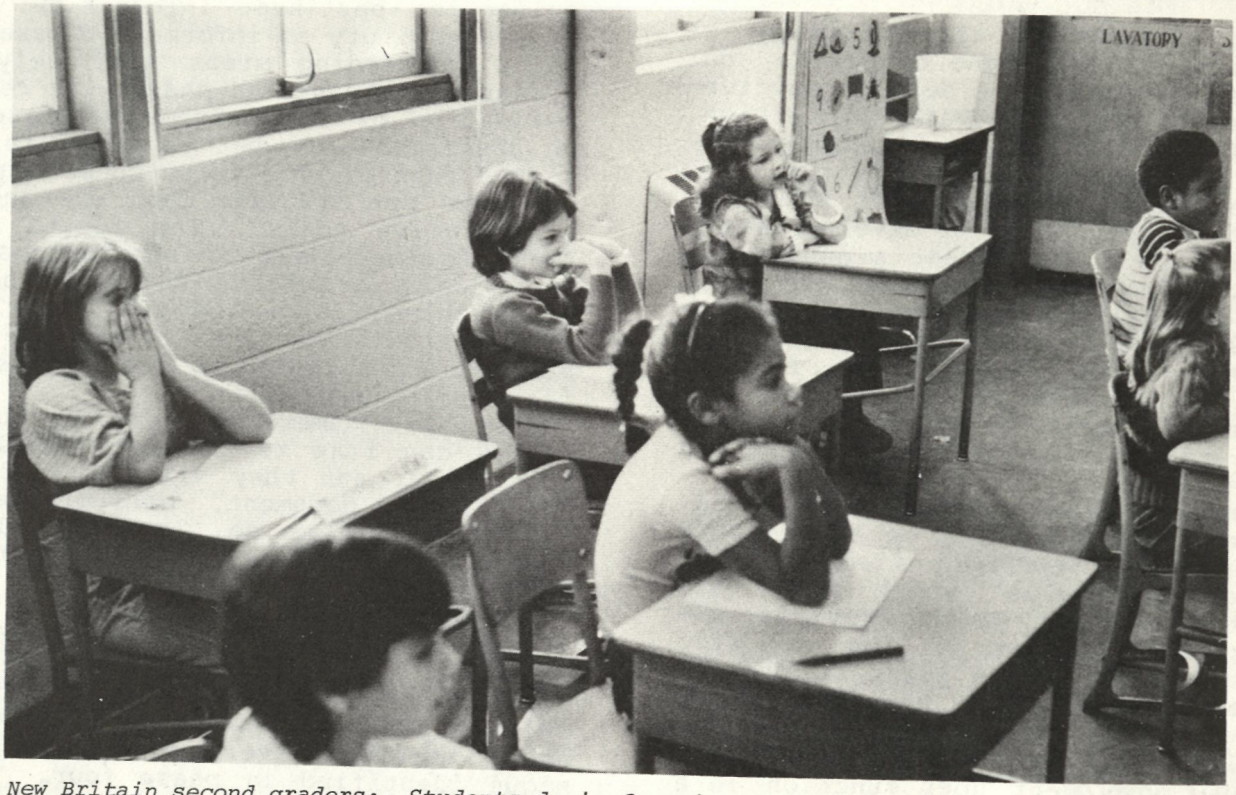
The Final Responsibility

Upon publication of the booklet on the planning process, the DEP will be available to provide specific guidance in its use. The February issue of the Citizens' Bulletin will provide additional detail on this problem.

The final responsibility and authority, however, will rest with the local community, with those who best understand their own unique groundwater protection needs, and who will be directly affected by the decisions. The well-being of the individual citizen is the responsiblity of government because, finally, the individual citizen is the government.

We urge each municipality to consider its need for formation of a groundwater protection work group, and that that group be charged with the responsibility to undertake forthcoming planning efforts. It is in the best interests of your town. ■

Next month's Citizens' Bulletin will present further details on the planning process, with specific recommendations for community actions.



New Britain second graders: Students do in fact influence the habits of their parents. (Photos: Robert Paier)

Hazardous Wastes Education Program

Creating Future Decision-Makers

By Steven Fish,
Assistant Director/Education,
Information and Education Unit

The DEP's Information and Education Unit has developed a multi-faceted education program that addresses the issues of hazardous waste and, in particular, household hazardous wastes.

The program was developed out of recognition that informed students become more knowledgeable adults and consumers and that, in fact, students can influence the habits of their parents or guardians. The program teaches what hazardous wastes are, where they come from, and what can be done to properly dispose of them. In addition, one component of the four-part curriculum is designed to identify some common home and garden toxics. Methods for reducing exposure to potential toxics found in the home are discussed, and the safe use and disposal of such products is encouraged.

Technical Support

School administrators, teachers, town committees, and interested organizations should be involved with the planning and coordination of the program from the beginning. DEP staff will assist in this planning and will attend any meetings necessary to help explain the program. Meetings such as these are important in establishing a good rapport with these groups and individuals.

Curriculum Dissemination -- Teacher Training

The DEP is making available a "Curriculum and Resource Package on Household Hazardous Materials." The curriculum was developed by the Golden Empire Health Planning Center in Sacramento, California. Some new material has been added to meet the specific needs of Connecticut.

The curriculum is divided into four volumes, based on grade-levels K-3, 4-6, 7-8, and 9-12. Each grade-level volume consists of a one-week course on toxic substances commonly found in the home. There are numerous activities and lessons included in each volume. The lessons can be easily implemented within a school's existing curriculum.

Workshops

The DEP will conduct in-service or after-school workshops focusing on this curriculum. The workshops are designed for teachers at all grade-levels and stress a hands-on approach. Activities from the curriculum are reviewed. The curriculum, as well as other supporting material, will be given to the teachers at this time. There is no cost for these workshops or the curriculum.

Direct Service Program With the Students

This part of the program is designed to make students aware of hazardous substances and the various ways of dealing with the problems they can cause.

The program is conducted over a two- to three-week period, with staff from the Information and Education Unit conducting in-class lectures and demonstrations. Multi-media materials are provided to reinforce the basic information.

The Role-playing Situation

The cornerstone of the program is a role-playing situation that is assigned after the students have been exposed to the lectures, demonstrations, and multi-media programs. Patterned after the role-playing in the National Wildlife Federation's CLASS Project curriculum, it involves students in a real life situation of siting a hazardous waste treatment facility in their city. They draw on what they have learned, assuming the roles of town officials such as mayor, health official, members of the Conservation Commission, business people, chemical hauling company executives, and hazardous waste treatment specialists.

A situation is given to the students. They study their roles, develop arguments and prepare for a "town meeting" where a decision is made in regard to the correct treatment of wastes.

Learning to Affect Decisions

Students learn what hazardous substances are, where they come from, and how we use them in our household products. In addition, they become keenly aware of the complexities of the proper handling and disposal of hazardous substances. They learn about the roles of federal, state and town government, local businesses, and the role the average citizen can play in affecting decisions.

It is preferred that the Hazardous Waste Education Program be offered in conjunction with a community household hazardous waste cleanup day, so that the students and adults in a given community can learn and work together in resolving the problems of hazardous waste treatment. Even if your community is not involved with a cleanup day, any one of these components can be implemented and presented to students.

How to Arrange the Program

The Hazardous Waste Education programs are offered by arrangement through the Information and Education Unit. DEP staff take into consideration existing curriculum objectives in any school system when introducing this program. The program does require homework assignments and a good deal of in-class follow-up by the teacher. If you are interested in arranging this program or would like more details, please call DEP's Information and Education Unit at 566-8108. ■

Steven Fish conducts a workshop: The hazardous waste program can be integrated into existing school cirricula.

A Review of the Council on Environmental Quality's Annual Report

By
Leslie Lewis
Citizens' Participation Coordinator

The Connecticut Council on Environmental Quality recently issued its 1985 Annual Report. As in previous years the report reviews the condition of Connecticut's environment and makes recommendations for the future.

Recent Trends

The major focus of the 1985 report is on urban parks, outdoor recreation, and natural heritage preservation. A summary of recent trends in this area reveals six central facts:

(1) Demand for outdoor recreation opportunities is increasing steadily while the supply of public outdoor recreation lands remains almost static and the supply of potential public recreation land is shrinking.

(2) Demand for certain types of public outdoor recreation (i.e., water-based) greatly exceeds supply, creating management problems for the DEP and frustration for the public.

(3) Although a comprehensive inventory of Connecticut's native plants and animals and their habitats has been developed and mapped, some species are being lost because of a lack of a wide-ranging, well-funded effort to preserve them.

(4) Outdoor recreation opportunities and natural lands are under acute pressure where they are the most limited -- in urban areas. Cutbacks in federal urban parks funding and other municipal considerations have seriously hurt cities' efforts to maintain their urban parks.

(5) Federal funding for open space acquisition and park development has been cut by 80 percent since 1980, demolishing Connecticut's five-year plan, begun in 1978, for providing outdoor recreation opportunities and for preserving the state's natural heritage.

(6) Land purchases by the state for conservation and recreation have, with rare exceptions, not been significant.

Recommendations for the Future

According to the report, Connecticut may be losing up to 17,000 acres of natural lands per year. In order to help alleviate the pressures affecting land preservation, CEQ has outlined future needs and developed recommendations

which would address the problem.

Of immediate concern is the preservation of the state's natural diversity. While the DEP's Natural Diversity Data Base is an excellent tool, it must be coupled with steady annual funding and a logical preservation program to ensure the continued desirability of the state as a place to visit and live. In addition, a fund to help cities maintain their urban parks is also necessary.

Outdoor recreation opportunities, especially water-based, must be enhanced to keep pace with the growing public demand for such facilities. And, if land can be acquired for these various needs, it would be possible to provide otherwise unavailable forms of wildlife-related recreation and education. Since virtually all wildlife program funding comes from hunters, DEP's focus is, according to this report, upon hunting activities. Supplemental revenues would allow the DEP to develop additional non-game programs which would provide both management and recreation/educational opportunities for the public.

Where the Money Comes From

Obviously all of these new programs would require sources of funding. CEQ proposes the following revenue generation and distribution policies to provide the needed monies:

1) Creation of a $10 million per year "Urban Parks, Outdoor Recreation Lands, and Natural Heritage Trust Fund";
a) $2 million for urban parks,
b) $2 million for outdoor recreation lands,
c) $6 million for natural heritage preservation.

2) A steady, predictable source of revenue;
a) One-fifth of the existing one-half percent real estate tax,
b) Conveyance tax, or
c) One-tenth of net lottery revenue, or some combination of the above.

3) Natural Heritage preservation funds should be spent only when matched by private funds (at a 90-10 or 80-20 public to private ratio) establishing a public-private relationship.

4) A small percentage of the natural heritage funds should be utilized for maintaining the Natural Diversity Data Base, the state's system for identifying and evaluating natural lands.

5) A portion of the natural heritage funds should be placed in a permanent management fund at the time of acquisition.

6) Additional funds, totalling about $1 million annually, should be made available to the DEP to manage, protect, and conserve wildlife species which are not managed now. Potential sources of revenue include:
a) Excise taxes on wildlife-related products (except hunting and fishing gear), or
b) Sale of voluntary wildlife stamps, or
c) A portion of the resources in #2, or
d) Some combination of the above.

Other Issues

While the bulk of the report covered land preservation issues, other subjects were discussed as well. Ground water protection strategies involving state-local partnerships were presented, outlining current problems and potential solutions. A "Connecticut Environmental Quality Index" defined key issues and long-term trends in the health of the state's environment. "Environmental Almanac" is full of facts that may surprise, amuse, or dismay you in turn. Finally, there is a report of the 1985 activities of the CEQ.

The Council on Environmental Quality's Annual Report is interesting reading for those concerned about Connecticut's natural health, present and future. To obtain a copy, contact Karl Wagener, Executive Director, CEQ, State Office Building, Hartford, CT, 06106, or call 566-3510. ■

Underground storage tanks, installed in the 1950s, are being replaced to comply with new regulations to protect groundwater. (Photo: Robert Paier)

New Regulations on Underground Storage Tanks

By John Cimochowski, Senior Environmental Analyst, Local Assistance and Program Coordination

Reporting forms are now available for what is expected to become Connecticut's most far-reaching regulatory program, involving an estimated 25,000 to 50,000 underground storage tanks and facilities in the state.

Newly-effective state and federal regulations require notification and reporting to the Connecticut DEP of existing underground tanks for non-residential storage of oil and liquid petroleum products.

Under Connecticut regulations effective November 1, 1985, owners/operators of non-residential underground tanks for storage and handling of oil and petroleum liquids are required to report these facilities to the DEP. These new regulations include standards for the design and installation, replacement, operation, maintenance, and monitoring of these tanks.

In addition, effective November 8, 1985, U.S. Environmental Protection Agency (EPA) interim regulations call for notification to the DEP of certain underground installations not regulated by Connecticut. On May 7, 1985, the EPA issued interim regulations requiring corrosion protection on new underground tank installations. The federal interim regulations on new installations will remain in effect until permanent standards are promulgated, which is expected to be in 1987. The federal requirements adopted under Section 9002 of the Resource Conservation and Recovery Act (RCRA) amendment of 1984 address underground tanks and associated underground components storing motor fuels. This will include farm and residential tanks with a capacity in excess of 1,100 gallons which are used for storing motor fuels for non-commercial purposes.

Also included under the federal program in Connecticut are facilities storing substances covered in Section 101(14) of the federal "Superfund" legislation (Comprehensive Environmental Response, Compensation and Liability Act of 1980) which are not already regulated by RCRA. (For information on what materials qualify as Superfund hazardous substances, call the RCRA/Superfund hotline at 1-800-424-9346.)

The Connecticut registration form, which for existing facilities must be submitted by May 8, 1986, covers both state and federally regulated facilities. This form also includes information on exempted facilities.

Reporting/notification forms as well as a guidance manual on Connecticut's regulatory program are available at local town and city clerks' offices (for pick-up purposes only) as well as from the DEP.

Town and city clerks' offices are not prepared to answer questions or to mail these materials. Questions should be directed to the DEP at 566-4630. ■

A Record Year for Connecticut Osprey

By

DEP Wildlife Bureau

"If the past five years have been cause for cautious optimism by osprey watchers in Connecticut, then 1985 is reason for celebration," reported Julie Victoria, nongame biologist for the DEP's Wildlife Bureau. "This has been a record year for osprey, with 44 active nests and 72 fledgelings. Compared to 1984, this is a 16 percent increase in active nests and 57 percent rise in fledgelings. These are encouraging statistics for a species which was nearly decimated during the 1960s."

The osprey, or fish hawk, is one of the most widely-distributed birds in the world. Historically, ospreys were plentiful in New England; about 1,100 active nests were recorded between New York and Boston in the late 1940s. The early 1970s, however, saw a marked decline in the number of nesting ospreys, with only 115 active nests in the New England area in 1973. By 1974, only nine nests existed in Connecticut. Widespread use of DDT left the Connecticut River ecosystem virtually uninhabitable for ospreys. When fish contaminated with DDT were eaten by ospreys, the birds could not lay eggs with shells thick enough to support their weight during incubation, so reproduction was severely reduced.

"Fortunately, federal regulations in the early 1970s restricted the use of DDT and other pesticides," Victoria explained. "A steady recovery of osprey populations has occurred since the pesticide ban. We may never again witness the soaring osprey numbers of the 1940s, however, as development of coastal areas has limited the number of available nesting sites."

Each April, adult ospreys return to Connecticut from their southern wintering grounds to breed. The osprey feeds almost exclusively on fresh fish and, consequently, inhabits areas along seacoasts, bays, and large rivers. The preferred nest site is the top of a dead tree, although ospreys adapt themselves to other sites as well. They have been known to nest atop duck blinds, channel markers, roots of upturned trees, chimneys, school buildings, and utility poles. Ospreys readily use artificial nest platforms. Wildlife biologists encourage the use of such platforms in areas lacking natural nest sites. Pairs usually return to the same nest site, adding new materials each year. Ospreys do not restrict themselves to sticks when building their large nests; seaweed, bones, driftwood, cornstalks, and litter from nearby beaches and marshes may also be used.

A steady recovery of osprey populations has occurred since the pesticide ban. (Photo: L. L. Rue III)

Unfortunately, ospreys are not discriminating in their choice of nest materials. Monofilament fishing line has become a rather common nest-building material. Two young ospreys were recently found dead in their nest, strangled by some carelessly-discarded monofilament line. The Wildlife Bureau encourages the proper disposal of monofilament line to ensure that it is not accessible to ospreys or other wildlife.

"The successful return of the osprey to New England is an encouraging sign," Victoria stated. "It is an indication of what we can accomplish by taking timely, appropriate action in response to a critical situation. The DEP's Wildlife Bureau hopes to have further successes to report in the future." ■

Portrait of a Hurricane

By Diane Giampa,
Senior Environmental Analyst
and George Wisker,
Environmental Analyst

Hurricanes that present a threat to our shores originate in the tropical Atlantic or Caribbean waters. They are characterized by cyclonic (counter-clockwise) rotation of winds around a very low pressure center or "eye." The eye is an area of relative calm of seven to 20 miles in diameter. Wind velocity increases close to the eye and may exceed 150 miles per hour immediately around it.

The track of a hurricane is unpredictable. Generally, Caribbean storms travel northward, and Atlantic storms travel to the west, then veer to the northwest, north, or northeast as they approach the Carolinas.

Usually the hurricane weakens as it travels northward into cooler North Atlantic waters. The forward velocity of the hurricane tends to increase from 15 to 20 miles per hour, to as high as 50 miles per hour or more as it moves into the higher latitudes. This increase in forward velocity can offset the weaker winds and reduce warning time.

The Storm Surge

Most people think the destruction resulting from a hurricane is caused by high wind velocities. This is probably true for inland areas, but along the coast, the winds give rise to an even more destructive phenomenon known as storm surge.

> If we are wise, we will remember that nature will always demand respect.

As the storm moves over open water, the winds on the right hand side of the storm are augmented by the forward velocity of the storm. These high winds create a storm wave that is further augmented by the rise in water level caused by the low barometric pressure. The elevated water levels caused by the storm surge cause flooding and powerful storm waves can bring about tremendous destruction.

The Early Warning

Fortunately, Gloria did not live up to its full potential. Unfortunately, many people now think that the danger of Gloria was exaggerated by the media, and that we over-reacted to the storm. The attitude now seems to be "It wasn't as bad as they said it would be, so I'm staying put next time."

Gloria had as much destructive potential as the 1938 hurricane. Both storms followed similar tracks. Their forward velocities were high, wind velocities were over 100 miles per hour, and they struck developed coast areas. It was simply a matter of good luck that spared the New England area . . . this time.

The Hurricane of '38

In 1938, as early as September 16, U.S. weather experts announced that a full-fledged hurricane had developed in the Caribbean. No one was particularly alarmed, because most tropical storms get blown out to open ocean. However, by September 20, the storm began to curve northward. By the following day, the hurricane was rushing at 70 miles per hour, with gusts over 100, toward the Connecticut shore.

There were no accurate weather reports about the storm; radar had yet to be invented and ships in the Atlantic had moved out of its path. New Englanders were worrying about the unusually heavy rains of the previous few days, which threatened to flood the overburdened rivers. No one had any indication of the force of the approaching hurricane until it was too late.

September 21 was a hot, extremely humid day. The air pressure fell, and by one o'clock in the afternoon, the winds along the Connecticut shore had picked up to gale force. Within an hour, torrential rains began to fall. Soon after, a fast moving wall of water smashed against the shores of Connecticut,

Rhode Island, and Massachusetts. The winds and water tore through houses and other buildings, pushed boats and small cottages many yards inland, and twisted train tracks. Chunks of shoreline property were ripped away and washed out to sea by the hurricane's fury, altering the configuration of many parts of the coastline. The storm raised the Sound tides 10 to 17 feet above normal.

With little awareness of the approaching storm, most people went about their usual business. Safety precautions were not taken. In Connecticut, 85 persons died as a direct result of that storm. State property loss totalled $100 million.

The Approach of Gloria

This fall, as Hurricane Gloria tracked west-northwest from its origin near the Cape Verde Islands off Africa, its strength gradually increased. Upgraded to a hurricane on September 22, it gradually began to recurve northward and passed north of the Leeward Islands. By September 24, wind speeds had increased to over 100 miles per hour. The storm continued to turn in a more northerly direction, missing the Bahamas. Early on the morning of September 25, Gloria's maximum sustained wind speed was estimated at better than 140 miles per hour, with a central pressure of 27.07 inches.

It was becoming apparent that New England's chances of an encounter with Gloria were rapidly increasing. Fears that Gloria would follow the 1938 hurricane's path across the heart of New England were heightened as Gloria swept north-northeastward at an increasing rate of speed.

As Gloria sped northward, however, she began to weaken, probably as a result of passing over cooler northern waters.

The eye of the storm made landfall at Hatteras Island, North Carolina, and then Long Island, New York. Winds were 98 miles per hour, sustained, with peak gusts of 120 miles per hour at around 2:00 a.m. on September 27. Fortunately the very dangerous eastern half of the storm remained offshore until Gloria hit the Long Island coast and crossed to Connecticut around 12:00 noon on September 27.

Since the storm struck Connecticut and Long Island on a falling tide, flooding as a result of storm surge was less than anticipated. Water levels varied from four to seven feet above predicted levels all along the East Coast. In Connecticut, this translated into a storm high tide about one foot above the predicted high water for Bridgeport and three to four feet above mean high water in Groton.

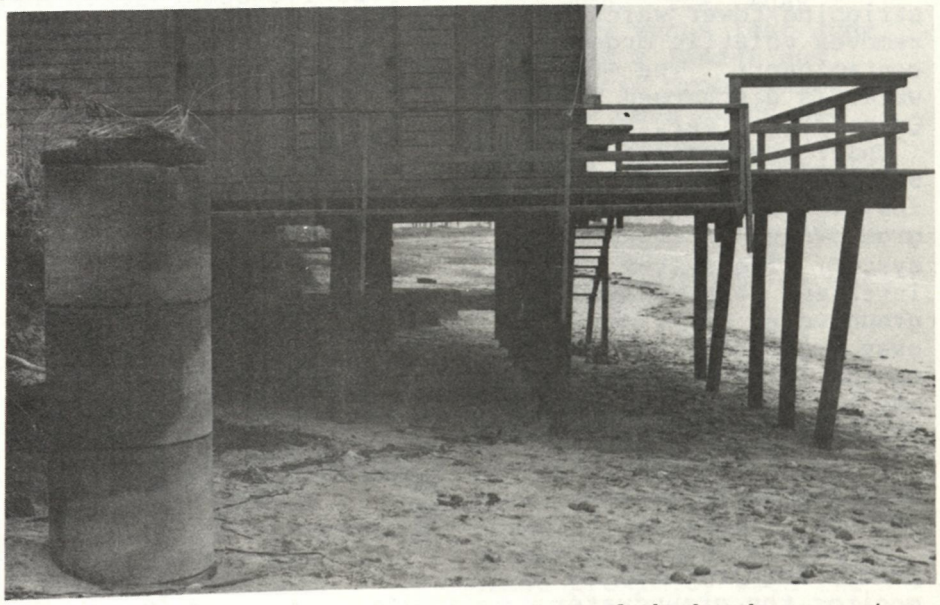
The resulting damage, in addition to coastal erosion, was confined primarily to boats and docks, while inland, the damage consisted mostly of fallen trees and downed power lines. The estimated damage for the East Coast was one billion dollars.

The Hurricane Next Time

If Gloria had maintained its winds at more than 100 miles per hour, and if it had hit on the high tide, the damage would have been far greater. As it was, there were four Gloria-related deaths in Connecticut.

Gloria had the potential to be an even more devastating storm, but our luck held. Someday, a storm as bad or worse than the '38 hurricane may bear down on New England. And, if we are wise, we will remember that nature, and certainly a great hurricane, will always demand respect. ■

In the December issue of the Citizens' Bulletin, the "Coastal Management Program" article was co-authored by Ron Rozsa, Staff Ecologist, Planning/Coastal Area Management. We regret that omission.



In Waterford, Gloria's storm surge scoured the beach, exposing a large underground portion of this coastal homeowner's well. (Photo: Ron Rozsa)

Groundwater Cleanup in Southington

The Environmental Protection Agency (EPA) announced that operation has begun of a groundwater cleanup system at the Solvents Recovery Services of New England (SRS) facility in Southington.

An on-site groundwater recovery system pumps contaminated groundwater migrating from the Solvents facility on Lazy Lane; chemical contaminants are removed in an on-site treatment system. The action fulfills a major portion of a 1983 consent decree between EPA, other intervening parties, and SRS. Operation began following the issuance of a discharge permit by the Connecticut DEP.

The on-site groundwater recovery system consists of 25 shallow wells which continually pump groundwater at the site's boundaries. The groundwater then passes through an on-site air stripping tower which removes volatile organic contaminants. The treated water is discharged to the Quinnipiac River.

Under the consent decree, SRS is also required to install an off-site groundwater interceptor system. The system will intercept contaminated groundwater as it moves away from the site. This contaminated groundwater may also be treated by air stripping. Construction of the off-site system is expected to begin this spring.

The DEP's discharge permit requires SRS to monitor the groundwater treatment system's discharge and treatment efficiency and to construct a new pipe for the discharge. SRS plans to construct the new discharge pipe this spring.

The consent decree required the company to recover and treat contaminated groundwater on and off the site, and to improve on-site storage and management of hazardous wastes.

SRS has been recovering organic solvents by distillation at this facility since 1955. Wastes from the distillation and recovery process were stored and disposed of until the mid-1960s on the 12-acre site west of the Quinnipiac River. SRS waste has been linked to the contamination of a Southington municipal well. ■

Eagle Watch Announced

The DEP's Wildlife Bureau, in cooperation with Northeast Utilities (NU), has announced development of a public observation and interpretive area focusing on wintering bald eagles at NU's Shepaug hydroelectric site in Southbury. The area will be open to the public until March 15, 1986. Hours of operation will include Mondays, Wednesdays, and Fridays from 10 a.m. to 4 p.m., and Saturdays and Sundays from 9 a.m. to 1 p.m. The area will be closed to the public on Tuesdays and Thursdays. During all hours of operation, staff from NU and the DEP will answer questions about eagles and assure public compliance with the area's rules of operation. An observation shelter will house an exhibit focusing on bald eagles in Connecticut.

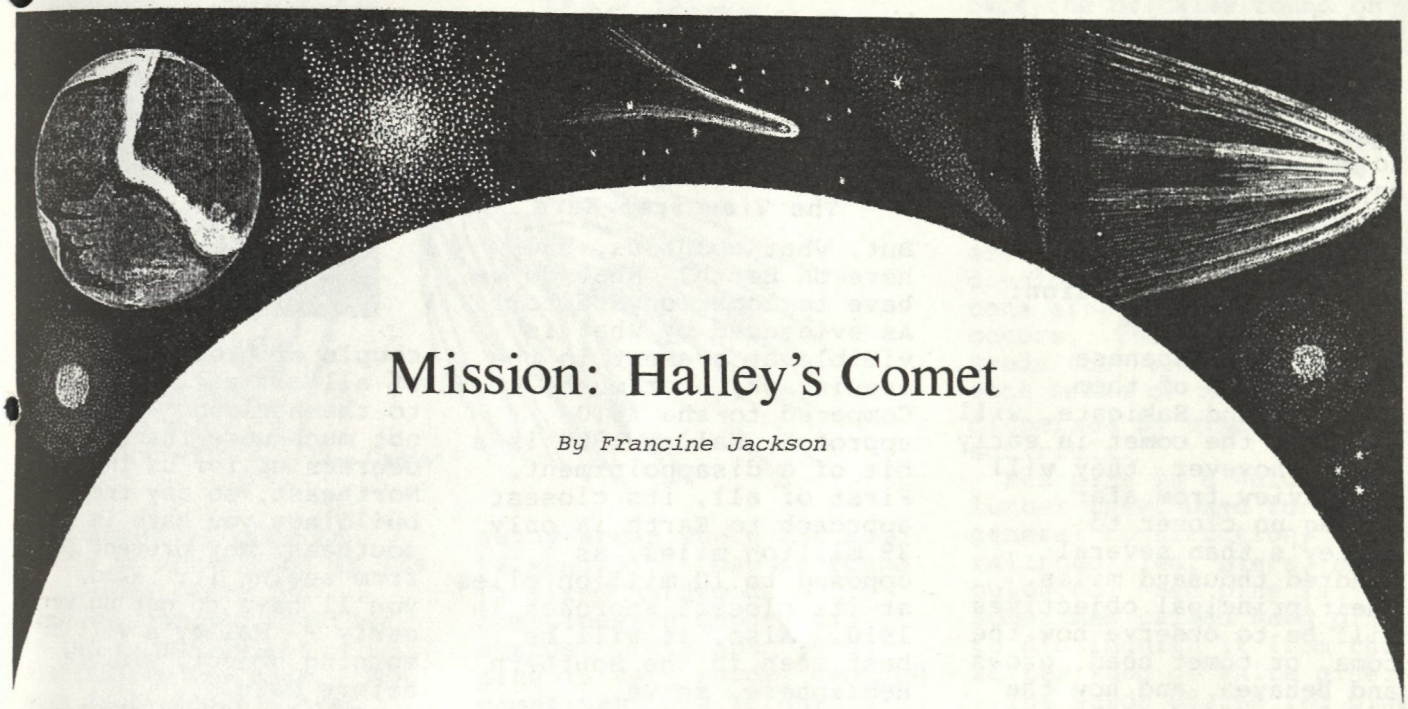
The interpretive area is designed to acquaint visitors with the identifying characteristics and wintering habits of the bald eagle. Last winter increased publicity surrounding the eagles brought more visitors and created a potentially disturbing situation for the eagles.

Though the interpretive area offers visitors an opportunity to observe bald eagles, strictly-enforced rules of operation should safeguard the birds' welfare this year.

Northeast Utilities and the DEP are pleased to provide the public an opportunity to learn about the bald eagle and hope that such knowledge will increase the public's appreciation for our state's natural resources. ■

Correction

The eight feet tall, 20 feet long Dylophosaurus, at Dinosaur State Park in Rocky Hill, which was depicted in our November issue, should have been identified as "Double-crested Lizard." ■



Mission: Halley's Comet

By Francine Jackson

We know that Halley's Comet is coming back. Despite rumors that the comet had been spotted breaking into two or more parts 75 years ago, it was seen in 1982, by astronomers D.C. Jewitt and G.E. Danielson, who photographed it using a high-intensity, ultra-sensitive camera called a charge coupled device (CCD). With that, they were able to capture the head while it was still beyond the orbit of Saturn -- over a billion miles from us. Taking this image of Halley's Comet was similar to photographing a New York ice cube from San Francisco.

The coming of Halley's Comet in 1985-86 is very different in many ways from its last visitation. Very importantly, of course, we await this return virtually free of fear and superstition: no gas masks, no comet pills, no human sacrifices.

New Space Technology

This time, technology has progressed to the extent that Earth is sending space probes to Halley's Comet, to dissect and analyze it from incredibly close range. Going are five spacecraft: one European, two Soviet, and two Japanese.

Giotto, from the European Space Agency, is named for the Italian artist Giotto di Bondone who, in his 1303 fresco "The Adoration of the Magi," depicted the Star of Bethlehem as a comet; it is believed his inspiration came from Halley's Comet, known to have appeared in 1301. Giotto (the spacecraft) is equipped with a camera, allowing us a chance to view the comet nucleus; it is programmed to approach to within about 1,000 miles of the nucleus. Because we are unaware of the exact dimensions and density of the comet, which we assume Giotto will be penetrating, this is considered a suicide mission -- Giotto will most likely be destroyed.

The Soviet Mission

The two Soviet craft are called Vega, short for the Russian words for Halley and Venus. Both are going to Halley's Comet by way of the planet Venus. The Soviets have had great luck with all their missions to this most hostile of worlds, including two probes which landed and sent back photos of the Venusian surface several years ago. The Vegas passed by Venus last June, releasing a lander and atmospheric probe which was to relay data about the planet's temperature, pressure, and atmospheric makeup, then soft-land on the surface to analyze soil samples, much as NASA's Viking landers did on Mars in the 1970s.

Meanwhile, the main sections continued on to Halley's Comet, for rendezvous dates in early March. The first to arrive, on March 6, will approach to within 20,000 miles of the comet. If it is not destroyed from this close proximity with the comet, then the second Vega will halve the distance one week later. Both, in

addition to photographing the comet, are carrying equipment to study the composition of the comet's dust and gas particles, and to determine if there are any magnetic phenomena associated with the comet nucleus.

The Japanese Mission: Sakigate

Finally the Japanese craft. Both of them, Planet-A and Sakigate, will approach the comet in early March; however, they will truly view from afar, coming no closer to Halley's than several hundred thousand miles. Their principal objectives will be to observe how the coma, or comet head, grows and behaves, and how the comet is affected by the sun's energy -- the solar wind.

The Scrapped U.S. Mission

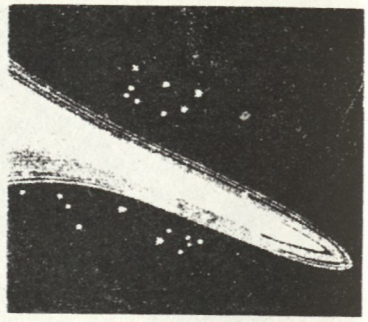
You may have noticed there is no mention of a U.S. cometary expedition. Despite many attempts and several planned expeditions, all funding was cut, scrapping all plans for an American mission. However, that doesn't mean we are out of it altogether; several U.S. experiments are hitching rides on the existing craft, including an American-made dust analyzer on one of the Vegas. In addition, NASA recycled a space craft originally used to monitor the sun, altering its orbit and repairing some of its equipment so that it could pass, not by Halley's, but by Comet Giacobini-Zinner. It passed by the comet's head last September, measuring both the density of its head and tail, and the influence of the solar wind on the comet. The results will be put to good use in determining the exact flight plans of the five Halley intercepts, but, truthfully, a Giacobini-Zinner rendezvous just doesn't have the excitement of a Halley mission.

The View from Here

But, what about us, back here on Earth? What do we have to look forward to? As evidenced by what is visible at present in the evening sky, not much. Compared to the 1910 approach, Halley 1986 is a bit of a disappointment. First of all, its closest approach to Earth is only 39 million miles, as opposed to 10 million miles at its closest approach in 1910. Also, it will be best seen in the Southern Hemisphere, so we Northerners will not be getting the full effect of a beautiful evening comet. Right now (January), Halley's is visible in the western evening sky, in the constellation Aquarius, the Water Carrier. Although fairly hard to see from the city, a country sky will show you that it is brightening and its tail is slowly growing, with each passing evening. Unfortunately, it is setting about six minutes earlier each night, so by the end of January it will not be visible.

During February, the comet will venture around the sun, reaching its closest point (perihelion) on February 9. From there, it will begin to move away from the sun, re-emerging into a dark sky by the end of the month. However, the moon will then pose a problem with viewing, so your best bet is to wait until the first week of March.

By early March, Halley's will be at its best, looking like all those comet pictures you've seen. However, there will be a



couple of problems: first of all, it will be very low to the horizon -- probably not much more than 10 degrees up for us in the Northeast, so any trees or buildings you have in the southeast may prevent you from seeing it. Also, you'll have to get up very early -- Halley's will be a morning object, visible before dawn.

Likewise for early April. Halley's Comet will still be a morning object for the first week or so, but it will now be at its brightest. Then, by midmonth, it will start to climb higher and higher in the southern sky in the evening. It will also be dimming, and its tail will be shrinking, until it will once again become invisible to the naked eye by late April or early May, and will be gone from all but professional instruments a few months later.

Once-in-a-lifetime

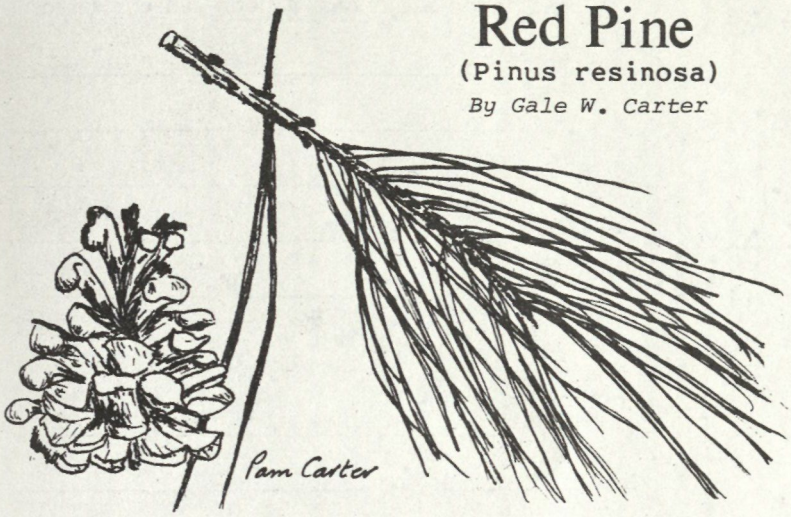
Even though viewing Halley's Comet may not seem like an easy and worthwhile venture, this may be, for some of us, a once-in-a-lifetime chance. Today, however, there are many people who saw it in 1910 and are eagerly anticipating this return; likewise, some of you will probably be pointing out the comet to your children and grandchildren in 2061, retelling what a wonderful experience it was to have seen Halley's Comet as a child 'way back in 1986. ■

Trailside Botanizer

Red Pine

(Pinus resinosa)

By Gale W. Carter



This beautiful pine can easily be identified by its extra-long, brittle needles, grouped together in two's, and by its distinctive red bark. The bark is in scaly plates which resemble pieces of a jig-saw puzzle. Its red-colored bark is the reason for its common name.

Red pine grows best in sunny areas where the soil is sandy. It may be found in mixed hardwoods or sometimes in separate stands. This species of pine is very hardy, growing sometimes to a height of 100 feet or more, with a diameter of up to three feet. Its cones are smaller than most pine cones, being from two to two-and-a-half inches long. The flexible scales lack the prickles found on the cones of the similar Austrian pine (pinus nigra).

The reddish flowers of red pine appear from April to June. Male and female flowers appear usually on the same tree. Two years are necessary for the development of the female cone after fertilization occurs. The two-winged seeds that are found under each scale of the cone are dispersed by wind and squirrels.

Red pine is a valuable lumber tree, used for general construction, railroad ties, piers, and pulpwood. Red pine is sometimes called hard pine to distinguish it from the softer wood of white pine.

The seeds of the red pine are the preferred food of the pine siskin and are relished by crossbills and pine grosbeaks. Chipmunks, mice, and voles feed on the seeds that they find scattered on the ground. ■

Letters to the Editor

It's amazing how little we know of what's around us; more so, what we take for granted of what's around us.

You make us more aware and more appreciative of our surroundings. Thanks, and more power to you.

John P. Langin Jr.
Hamden

Excellent publication. Keep up the good work. Useful, informative, and all that good stuff.

Fred Kaeser
Derby

We love the Citizens' Bulletin. We save them all. They're great for reference. Thanks for all your hard work.

L.V. Plunkett
New Haven

The Citizens' Bulletin welcomes letters from readers. Letters should be accompanied by name, address, and phone number. Let us hear from you.

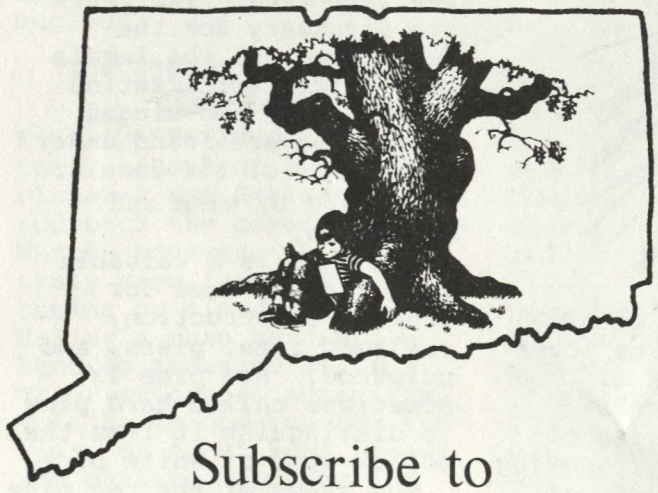
"The Connecticut Department of Environmental Protection is an equal opportunity agency that provides services, facilities, and employment opportunities without regard to race, color, religion, age, sex, physical or mental disability, national origin, ancestry, marital status, or political beliefs."

Endnote

Men have an indistinct notion that if they keep up this activity of joint stocks and spades long enough, all will at length ride somewhere, in next to no time, and for nothing; but though a crowd rushes to the depot, and the conductor shouts "All aboard!" when the smoke is blown away and the vapor condensed, it will be perceived that a few are riding, but the rest are run over . . . and it will be called, and will be, "a melancholy accident."

H.D. Thoreau

Rediscover Connecticut



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